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EDITORIAL

Although the problem of House jobs is *sub judice* and therefore beyond the critical reach of the *Journal* one interesting feature has emerged from the events of the last few months. It is increasingly obvious that the masters are becoming more and more out of touch with the views of the men, for the students' feelings were not sought nor apparently respected in an alteration to their own future.

The Dean showed great understanding in these recent anxious weeks when he offered to meet and discuss the matter rationally with a representative group of students. This opportunity enabled a far better relationship to be established and the relative roles of University, Hospital and Medical College were explained fully.

Perhaps Bart's could emulate the Architectural Association where there are two members elected to the governing body to represent the interests of the Students and make their opinions known. Ideally the Senior Secretary of the Students' Union should be an ex officio member of the College Council but this would never be tolerated by the traditions of the Hospital and of the profession.

It is undeniably a fact that in all teaching hospitals, not only our own, the decisions which change the undergraduate's life are made without reference to the generation which they ultimately concern. Universities change the requirements for entry to the Faculty and the rules of Examinations with the tacit if not overt approval of those who should speak for the students' interests. The medical school enact their own by-laws which complicate the already disadvantageous position. An example of this latter case is the Bart's ruling on qualification with the Conjoint diploma which is not allowed at Bart's until the time for the degree qualification arrives. This is not so in other hospitals.

Many departments within the Hospital make more autocratic decisions which are difficult to understand and impossible to maintain. The recent attempted prohibition of the majority of helmsmen from going to the Sailing Regatta was a glaring example of this, for the interests of the Hospital were surely identical with those of the students on this occasion. Should this have been successful while the helmsmen idled nostalgically in their laboratory and thought of Burnham, their mentors would have regarded themselves as excellent fifth-form masters. But Bart's is not a public school!

To bridge this void the Dean should institute regular and uninhibited discussions between himself, the students and as many of the Staff as are interested. There is no doubt that the students would respect this move and behave with maturity and integrity whilst the Staff would learn something of their " pupils " thoughts.

It is on the youth of the profession that

the future depends and they must lend a hand at laying the foundations on which they are to build. Respecting age, experience and sagacity but bringing vitality, enthusiasm and drive into the future of themselves, their hospital and the world. It was a boy of twelve who confounded the doctors in the temple which shows age and position do not make quiet, reasonable and useful discussion impossible.

New Jobs and Old!

It is proposed that in future the *Journal* should be responsible for mediating the various advertisements that are sent to the Dean for locums etc. This will mean that a larger selection of Bart's men have the opportunity to apply than the present system allows since the notice board is rarely seen by the majority of the qualified and exiled Bart's men.

Before the war the College Secretary ran a private employment agency for Bart's doctors to everyone's advantage and it is hoped that the new arrangements will be as satisfactory. The charge for each insertion irrespective of length will be 10/- and applications should be made to the Manager of the *Journal*.

ANNOUNCEMENTS

Engagements

CAMPBELL—THOMAS. The engagement is announced between Dr. Euan David Ross Campbell and Dr. Susan Thomas.

DOWNHAM—CURTISS. The engagement is announced between Dr. David Downham and Jennifer Curtiss.

IRWIN—NAUMANN. The engagement is announced between Dr. Michael Henry Knox Irwin and Elizabeth Naumann.

JONES—WHITING. The engagement is announced between Dr. Brian Stanley Jones and Hilary Frances Whiting.

Marriage

BARNSLEY—HANNAM. On May 24th, Dr. Arnold Barnsley to Mrs. Betty Charmian Hannam.

Golden Wedding

ROWLAND—COOK. On May 15th, 1908, Penry Rowland, M.D., to Janet Cook.

Births

BIRDWOOD. On May 3rd, to Gaynor, wife of Dr. George Birdwood, a son (John Richard Gresford).

IVORY. On May 6th, at Warren, Pa., U.S.A., to Eleanor, wife of Dr. P. B. C. B. Ivory, a son (Mark Caesar).

THOMAS. On April 28th, to Phoebe, wife of Dr. Duncan Thomas, a daughter (Christine).

WESTON. On May 17th, in Jamaica, to Anne, wife of Peter Weston, F.R.C.S., a son.

Deaths

ADAM. On April 10th, Dr. George Henry Adam. Qualified 1907.

ATKIN. On May 9th, Dr. Charles Sydney Atkin. Qualified 1913.

GARSON. On May 6th, Philip Garson, F.R.C.S. Qualified 1924.

CALENDAR

June

Sat. 14th Dr. R. Bodley Scott on duty.
Mr. R. S. Corbett on duty.
Mr. R. W. Ballantine on duty.
Tennis: v. St. Georges (A).

Sat. 21st Dr. E. R. Cullinan on duty.
Mr. J. P. Hosford on duty.
Mr. C. Langton Hower on duty.
Tennis: v. U.C.H. (A)
Cricket: v. Royal Dental and Charing Cross Hospital (H).

Sat. 28th Medical and Sugical Units on duty.
Mr. G. H. Ellis on duty.
Tennis: v. Middlesex Hospital (H).
Cricket: v. Jesters (H).

July

Sat. 5th Dr. Geoffrey Bourne on duty.
Mr. J. B. Hume on duty.
Mr. F. T. Evans on duty.
Cricket: v. U.C.S. Old Boys (H).
Tennis: v. Dulwich School (H).

Sat. 12th Dr. A. W. Spence on duty.
Mr. C. Naunton Morgan on duty.
Mr. R. A. Bowen on duty.
Cricket: v. Incogniti (H).
Tennis: v. London Hospital (H).

Medical Staff

The following appointments to the medical staff take effect from the dates mentioned:—

Department of Pathology
Senior Registrar: Dr. E. G. Rees going to U.S.A. for 12 months: Dr. J. A. Gobert-Jones will act as Senior Registrar during his absence from 1st October, 1958.

Department of Diagnostic Radiology
Registrar: Mr. A. R. Chrispin: 1.10.58.

Department of Anaesthesia
Registrar: Mr. A. M. Keil.

* * *

APRIL, 1958, CLINICAL ENTRY

Busfield, H. M. B.
Hertford College, Oxford.

Cawdery, J. E.
Oriel College, Oxford.

Meade, T. W.
Christ Church, Oxford.

Stephan, Miss J. C.
St. Hilda's College, Oxford.

Waring, Miss A. M.
Lady Margaret Hall, Oxford.

THE HIDE OF THE RHINOCERUS

by **Prof. A. J. E. CAVE**

IN PINPOINTING the idiosyncrasies of one's fellows, traditional practice invokes, by way of metaphor or simile, the real or imagined characteristics of particular members of the animal kingdom. Such conventional attributions are usually apt, succinct and convenient of employment. This socio-zoological terminology may involve reference to the whole animal (as when a mischievous child is called a monkey or a stubborn man a mule) or to some particular of its anatomy (e.g., the heart of a lion, the brain of a hen, the eye of a hawk). All understand the connotation of

such terms, which compose a considerable repertoire. Therein "the hide of a rhinoceros" enjoys a long-established usage, as the ideal derogatory term to be applied to the "thick-skinned" fellow who is impervious to blandishment and censure alike, whose monumental stolidity is undisturbed by criticism and who rests impenetrably armoured in indifference. Such a one fits awkwardly into community life, wherein, fortunately, he is not over-abundant, though in diverse walks of life in modern societies he may be discerned among those who, of set purpose and from the humblest origins, have attained the summit of worldly success.

The purpose of this notice, however, is not a disquisition upon psychology or sociology, but an examination of the factual basis for the adoption of the rhinoceros as the classical embodiment of thick-hidedness, recalling that some other animals (e.g., elephant, hippopotamus, giraffe) have sufficiently thick skins, yet have not been selected by custom as exemplars. For it is pertinent to ask whether the choice of the rhinoceros in this connexion is merely empirical or whether it rests upon a scientific basis and to determine what distinctive physical characters of rhinoceros skin have so impressed naturalists and hunters and influenced popular opinion.

Despite much information on the subject gleaned from the flaying of wild or captive animals, the final answer to these questions must obviously be sought from the histological examination of rhinoceros skin and the discovery thereby of its exact intimate structure. The opportunity to undertake such examination was recently provided through the generous co-operation of two professional colleagues—Dr. E. H. Williams, of Arua, in the West Nile District of Uganda, and Dr. D. B. Allbrook, of the Anatomy Department, Makerere Medical College, Kampala. Both these gentlemen, indefatigable in sustained efforts to procure rhinoceros material for the writer's researches, have now increased his debt of gratitude by providing items suitable for microscopic examination—Dr. Williams, by collecting in the field (under the greatest difficulties) specimens of the skin and some other organs, Dr. Allbrook by forwarding blocks and slides of the collected material after preservation and processing. The source of the specimens was an immature White Rhinoceros (*Ceratotherium simum*). For the first time, therefore, it has been possible to study the histological nature of rhinoceros skin, of this species at least: that of the other rhinoceros species remains as yet apparently undetermined.

Before detailing the results of its microscopical examination, it is convenient to review that general knowledge of rhinoceros skin gleaned from the observation of living, and the flaying of dead, animals, which has formed the basis of its traditional reputation.

To one familiar with the smooth, supple, hairy skin of most mammals, that of the living rhinoceros appears to be "dead" and inert—a dull, wrinkled (sometimes tuberculated), hairless armour plating, resembling oak-bark rather than mammalian tissue. Not only does it give an impression of extraordinary thickness, but experience demonstrates the difficulty of its penetration save by sufficiently sharp or powerful weapons.

Upon flaying, the detached hide is found to be tremendously thick, heavy beyond expectation and exceedingly difficult of manipulation. It may weigh almost a ton and require a dozen or more men to drag it over the smoothest ground. Its consistency is that of a sheet of thin steel and it defies all attempts at folding (Heller[3]). So thick and rigid is it that it cannot be worked and (beyond the occasional manufacture from it of curios) it lacks commercial value and is of service to the taxidermist only.

It is these pronounced physical properties of density, thickness and inelasticity which have so caught the attention of naturalists and collectors and have conferred on the rhinoceros its unique reputation in respect of its skin. The phrase "the hide of a rhinoceros" is therefore justified by general experience as the most fitting designation of an impenetrable, dense and unyielding exterior.

Microscopical study of White Rhinoceros skin sections reveals the structural basis of its distinctive physical properties, in the form of an enormous augmentation of the dermis proper, found to be composed of the densest possible felting of pure collagen fibres. However, it further discloses the presence in the dermis of hair follicles, sebaceous glands, specialised apocrine sweat glands and blood vessels in fair abundance. The skin is discovered, indeed, to be no inert, lifeless outer wrapping, but instead to be a protective, sensitive, excretory organ, of typically mamma-

lian constitution though specialised in certain particulars in conformity with the animal's mode of life. (As anticipated, sectioning of the skin-blocks proves difficult, and the best sections obtainable measure 15-20μ thick).

The heavily cornified epidermis is unexpectedly thin (averaging 1 mm.), although in regions of the body not examined it may be thicker: it has the classical component layers and sends down into the dermis hair follicles, sebaceous glands and peculiarly large apocrine sweat glands. The dermis is 18-20 times the thickness of the epidermis. A section of the relatively thin belly skin yields the following mensural details:—

epidermis = 1 mm.

stratum corneum	0.25 mm.
„ lucidum	0.5 mm.
„ granulosum „ germinativum	0.25 mm.

dermis = 18 mm.

In other situations the stratum corneum equals or exceeds in thickness the stratum Malpighii. The stratum lucidum is not everywhere apparent. The stratum granulosum is some two cells thick. Small melanin granules are present in the stratum corneum.

The extraordinarily thick dermis is a felting of dense collagen fibres, running in all directions relative to the surface. It contains no admixture of elastic fibres, any such present in the sections being confined to the walls of the skin arterioles. It is this extremely thick, non-elastic dermal layer which accounts for the characteristic physical properties of rhinoceros skin.

The hide is attached to the deeper structures by a non-resistant superficial fascia permitting facile removal of the skin. This layer is uniformly rich in subcutaneous fat, which in adult animals is a good inch thick on the back and two inches thick on the belly. Conservation of the body heat is thus assured by so substantial an insulating layer.

The presence of hair follicles containing in their depths the stumps of body hairs is noteworthy, since the animal is generally described as lacking body hairs save for those of the eyelashes and of the ear- and tail-fringes. In certain places hair-shafts extend further up the follicles, some of them even reaching the body surface. Nowhere are hairs discovered freely projecting. A distinct, if scanty, equipment of projecting body hairs, becoming less obvious with increasing age, has been noted by Bigalke[1] in a young White Rhinoceros. It may be that such projecting hairs are duly removed by the repeated friction of mud-bathing and rolling, or that they are shed naturally since any external hairy coat is rendered superfluous by the thickness both of the dermis and its underlying subcutaneous fat.

The sebaceous glands are relatively small and feebly developed: they are of piriform appearance and tend to be arranged in single pairs around individual hair follicles.

The ordinary, small type of sweat gland is not found in any of the sections studied. Instead, relatively enormous apocrine sweat glands (recalling those of human axillary skin) are an obtrusive histological feature. These large glands, not particularly numerous in the sections examined, occur in the superior part of the dermis as coiled networks, disposed in open basket fashion around the bases of the hair follicles, each gland having an individual blood supply. Their ducts spiral surfacewards, being fairly capacious in their intra-dermal, but narrower in their intra-epidermal, extent. Both the glands and the ducts are closely surrounded by numerous myoepithelial cells of remarkably large size, which constitute a distinctive and unexpected structural feature. The large apocrine sweat glands are well vascularised by cutaneous vessels which pierce the deep aspect of the dermis (through 1 mm. wide "foramina") and divide freely within this layer to gain the individual glands.

Thus rhinoceros skin (in this species at least) is typically mammalian in constitution, but is functionally specialised in respect of its dermis and its sweat glands. Physiologically, it is a highly active organ, subserving tactile sensation, the prevention of heat-loss and the elimination of body fluid in exactly comparable fashion to the skin of any other mammal.

Since structure is but the morphological expression of function, the large apocrine sweat glands with their huge myoepithelial cells call for interpretation in terms of the animal's physiology. In the White Rhinoceros, as in other perissodactyl mammals, unwanted body fluid is discharged as sweat or urine. The daily urinary output of this crea-

ture is not known and would appear almost impossible of accurate assessment, even in the case of the captive specimens at present living in zoological gardens (London, Antwerp, Pretoria). This is because of the peculiar mode of micturition, which consists of a discontinuous series of partial bladder contractions, at irregular intervals, during the animal's progress around its territory. Sweat output must complement that of urine, and a certain (but as yet unknown) degree of reciprocity must obtain between the two. But additionally, so large a beast as the rhinoceros has need of some active mechanism whereby body fluid can be discharged suddenly and copiously, as after severe exercise, in order to obviate a deleterious rise in body temperature. Normally, the White Rhinoceros moves about in cool, dull or cloudy weather only, and avoids bright sunshine. When pursued on a hot day it can be seen to sweat, and Coryndon[2] has reported the sudden drenching with sweat of a struggling young animal—a discharge so profuse as to simulate its dousing with a bucketful of water. These facts suggest that the body temperature remains, and must be maintained, at a fairly constant level, and that machinery of some sort is necessary to ensure the occasional sudden release from the body of considerable quantities of fluid in the form of sweat. Such machinery is obviously to hand in the large apocrine sweat glands and in the enormous and numerous myoepithelial cells which are so striking a feature of their structure.

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(3) Heller, E. (1913) The White Rhinoceros, *Smithson. Misc. Coll., 61,* No. 1.

A CASE OF HASHIMOTO'S DISEASE

by **D. WEITZMAN**

THE TYPICAL clinical picture of Hashimoto's disease is that of a middle-aged woman, with a goitre of recent onset, and who may or may not have myxoedema (Luxton, 1957). The serum proteins are usually abnormal, with an increase in gamma-globulin; in consequence, abnormal flocculation reactions are obtained with thymol and zinc sulphate, exactly as in liver disease. The thyroid itself is infiltrated with lymphocytes and plasma cells. Recent work (Roitt et al, 1956) has indicated that the disease process is the result of auto-immunisation. Animal experiment (Witebsky, 1957) has shown that thyroglobulin is antigenic: release of this substance into the circulation, following injury to or disease of the thyroid gland, can provoke antibody formation. Individuals naturally vary in their capacity to produce thyroid antibody: should this reach a high titre, an antigen-antibody reaction takes place in the thyroid with destruction of normal histology and its replacement by lymphadenoid tissue. The presence of circulating thyroid antibody can be demonstrated by the technique of Doniach and Roitt (1957). Thyroid extract and the patient's serum are suspended separately in agar with a neutral zone of saline between (Fig. 1). Thyroglobulin and serum gradually diffuse into and meet in the saline zone: if thyroid antibody is present in the serum, precipitation occurs with the formation of an opaque white ring.

It is thus apparent that any form of thyroid disease or injury may be followed by the subsequent development of Hashimoto's disease provided that thyroid antibody is formed in high titre, although it is uncommon for

such titres to occur. Cases in which myxoedema follows subtotal thyroidectomy for

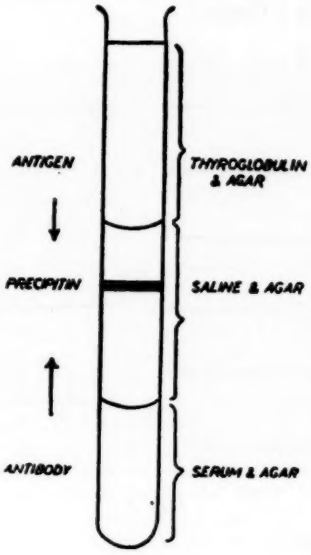

Fig. 1

thyrotoxicosis may be explained on this basis and the condition is seen also in association with simple colloid goitre, untreated thyrotoxicosis and thyroid carcinoma (Thomson, 1957). It may also result from thyroiditis due to mumps virus (Eylan, et al, 1957). In many cases the onset is insidious without any apparent precipitating factor. In the patient described below, a goitre and myxoedema developed rapidly over the course of a few weeks after an onset suggestive of an acute inflammatory thyroiditis.

Case Report

E.S., a housewife of 52, presented with swelling of the face and neck, and pain on the right side of the neck of five weeks' duration. She had been treated by her private doctor with anti-histamines, as a possible case of angioneurotic oedema, but without effect. On direct questioning she admitted to hoarseness, slight diminution of hearing and enhanced sensitivity to cold. Menstrual loss was unchanged. There had been no known contact with rubella.

Examination revealed an obese, quiet and rather depressed woman. The amount of swelling of face and neck was difficult to assess because of generalised obesity. There was no venous engorgement in the neck. The thyroid was firm and only slightly enlarged on her first visit: by a month later, just before commencing treatment, a moderate-sized goitre had developed. The skin felt normal: the hands were cold and slightly cyanotic. The heart-rate was about 60 per minute.

Investigation

X-ray of the chest and superior mediastinum was normal. The E.C.G. (Fig. 2) showed bradycardia with flattening or inversion of T waves. The serum cholesterol was 605 mg. per 100. ml. The serum protein-bound iodine was only 1.3 micrograms, well below the lower normal limit. A thyroid precipitin test was carried out by Dr. Deborah Doniach at the Institute for Clinical Research and proved strongly positive. The serum proteins were normal and the flocculation tests negative.

Treatment with 0.1 mg. of L-thyroxine daily was instituted. Within a few weeks there was a marked change in appearance and personality: she became alert and cheerful. The goitre decreased considerably in size and the serum cholesterol fell to 315 mg. The E.C.G. reverted to a normal pattern (Fig. 3). Nine months after the onset of the disease, thyroid antibody was still present in high titre in her serum. An attempt was made to observe the effects of stopping treatment and she was left without thyroxine for some weeks. On her next out-patient attendance, however, she stated that she had become so slow and depressed that she had obtained a further supply from her private doctor.

Comment

This appears to be an example of lymphadenoid goitre following acute or subacute thyroiditis. In the absence of histological confirmation, the diagnosis remains presumptive, but is supported by the high titre of thyroid antibody. This test is, however, not entirely specific since thyroid antibody is produced in other diseases, though seldom in high titre. The normal serum proteins and flocculation tests are surprising, since these are regarded as valuable in diagnosis (Goudie *et al*, 1957: Luxton, 1957), especially in differentiating Hashimoto's disease from carcin-

oma (Doniach and Hudson, 1957). The patient has declined biopsy, but the clinical progress hardly suggests malignancy: she has now been under observation for fifteen months with continued good health and disappearance of the goitre.

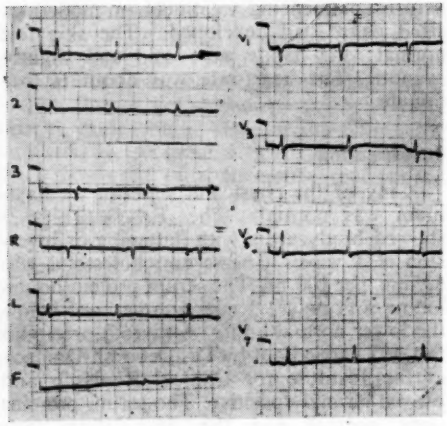

Fig. 2

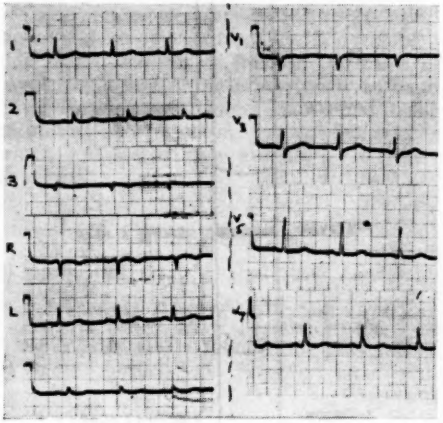

Fig. 3

Summary

An account is given of the rapid development of myxoedema and a goitre in a middle-aged woman. The clinical picture was typical of Hashimoto's disease and the diagnosis was supported by the finding of thyroid antibody in high titre in the serum. The immunological concept of the disease is briefly reviewed.

I am indebted to Dr. Deborah Doniach for her assistance with this case and to her and the Hon. Editors of the Proceedings of the Royal Society of Medicine for permission to reproduce Figure 1.

Figures.

Fig. 1. *Precipitin test for thyroid antibody (Reproduced from Roitt, I. M. and Doniach, D. (1957) Proc. Roy. Soc. Med., 50, 958, by kind permission of the authors and the Honorary Editors.)*

Fig. 2. *Electrocardiogram before treatment. Note the flat or inverted T waves, found in myxoedema.*

Fig. 3. *Electrocardiogram after treatment. The T waves have returned to the normal upright pattern.*

* * *

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THE MODERN USE OF RADIOTHERAPY

by **R. J. M. WHITTLE**

Two controlling factors are invoked in the control of a malignant neoplasm. Firstly, there is the direct effect of ionising radiations upon the malignant cell. The response is governed by the radiosensitivity of the cell. Secondly, there is the reaction of the tumour bed or the host response. When deep-seated tumours are treated by apparatus in the deep therapy range, the dose delivered often falls far short of the tumouricidal level. The reaction of the tumour bed cannot make up for the primary failure and control of the tumour cannot be achieved. When megavoltage apparatus is used the tumour dose can be raised to perhaps twice the dose formerly possible. As a result, control will be extended over an increased number of tumours. But the radiotherapist is still dependent upon the second phase, and if the host response misfires, then with the passage of time, recovery of the malignant cells occurs. This may explain the regression of a primary tumour on the floor of the mouth, or palate, while the malignant nodes which have received an identical dose show only a tardy response. The treatment of a tumour resembles the firing of a rocket. If one stage fails to fire, the rocket will not achieve its orbit. When enthusiasm overreaches experience and an excessive dose is delivered the host response may, in fact, be inihibited.

Desjardins in 1930, divided tumours into into three groups—the radiosensitive, amongst which he numbered lymphosarcoma and seminoma; the moderately radiosensitive, such as cancers of the breast and skin; and the radio-resistant, the largest group which included cancer of the rectum and osteogenic sarcoma. This conception was based upon the effects of treatment by deep therapy apparatus. In the third group the results were so disappointing that even attempts at palliation were avoided until all other methods of treatment had failed. When supervoltage machines were introduced effective palliation in this group became possible. Desjardins conception of tumour behaviour was widely accepted and has formed the basis of radiotherapeutic practice for over thirty years. Now that megavoltage therapy is becoming available to an increasing number of patients this conception will have to be modified, cetrainly as far as palliation is concerned. This will not be achieved without a great deal of "mental indigestion". The stage has now been reached when a tumour situated in the most unfavourable circumstances can be given the dose prescribed by the radiotherapist. Unfortunately the ceiling dose is determined for him by the tolerance of the adjecant structures and supporting tissues.

At the present time when the hapless taxpayer and even the social reformer are embarrassed by the rising cost of the Health Service, it would not be impertinent to ask if the benefits megavoltage apparatus provide justify the heavy expenditure incurred. The advantages can be summarised in the following manner:—

1. **The depth dose is improved.** When the energy expended in the production of the radiation is increased, the wave length is reduced, and the beam becomes harder and more penetrating. The two figures show the depth dose curves—one for a 200 k.V. beam, the other for a telecobalt beam. When an oesophageal growth, which lies at a depth of 10 cms from the skin, is irradiated by opposing anterior and posterior fields, it would receive a 30 per cent. greater dose when treated on the cobalt unit.

2. **The skin reaction is mitigated.** The skin dose from a deep therapy beam is increased by backscatter from the deeper layers of the dermis towards the epidermis. The maximum dose occurs on the surface. This results in moist painful skin reactions occurring when 3,000-4,000 rontgens have been

given over a period of 4 weeks. With the cobalt beam, the range of the electrons which produce the ionising effect is of the order of centimetres and therefore the dose

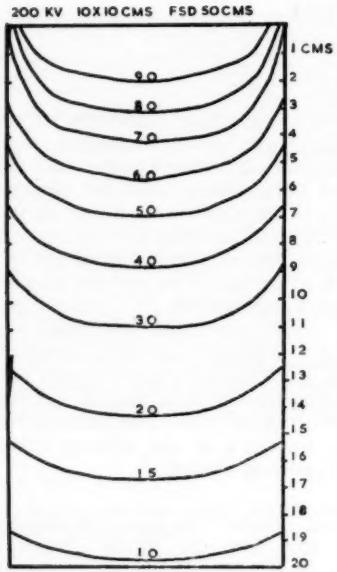
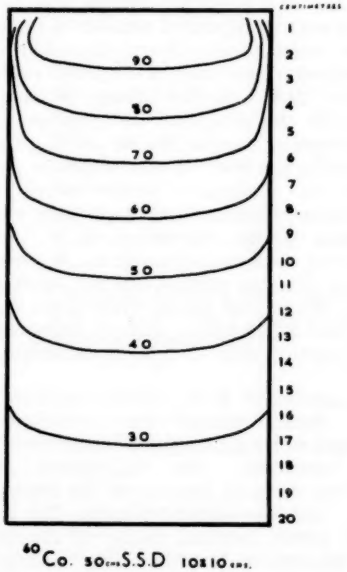


Fig. 1.

builds up as more electrons are set free, until the maximum build up occurs at a depth of 4 mm. As a result 7,500 r can be given over a period of 6 weeks and a brown pigmentation is the only outcome. From the patient's point of view, this is the greatest advantage afforded by megavoltage therapy. The protracted discomfort of a discharging raw area, the sensation of "burning," the sleepless nights, and the anxiety that something has gone wrong—all these features—the hallmark of the deep therapy machine, can be relegated to the past.

3. **The incidence of bone necrosis is reduced.** When a beam from a deep therapy machine traverses soft tissue and bone, the energy absorbed in the bone may show a five-fold increase over the absorption in soft tissue. This results from the photoelectric absorption by the heavy elements in bone. As a result there is a gross overdose in the bone and the soft tissue cells adjacent to it, which may bring about the death of the cellular component. Furthermore, neoplasm beyond the bone will be *protected* and underdosed. The irradiation of a tonsillar growth illustrates these points. A radionecrosis has occurred in the ramus of the mandible and because of the shielding of the tonsillar growth by the bone, the dose received by the tumour was actually 15 per cent. below the calculated dose. In contrast, the photoelectric absorption from a cobalt beam is negligible, and as a result there is no longer an excessive absorption of energy by bone. The virtual banishment of radiation necrosis of bone should follow the routine use of supervoltage apparatus. Caution will still have to be exercised when there is a superadded element of infection.

Physicists have approached the megavoltage goal from many different directions. The first attempt along conventional lines resulted in the installation of a million-volt x-ray machine at St. Bartholomew's Hospital in 1936. This machine has responded magnificently to the heavy demands made upon it, and a wide experience of supervoltage techniques has been acquired from the four thou-



^{60}Co. 50 cms. S.S.D 10 x 10 cms.

Fig. 2.

sand cases treated on it. However, 1,000 k.v. represented the practical limit and any further advance towards higher voltages would have to be made along quite different lines.

In the Van de Graaf generator, the requisite charge is built up by electrostatic means. through a continuously revolving belt. With this type of generator x-rays were developed at a potential equivalent to 2 to 3 million volts. The magnitude of the apparatus and mechanical problems hindered the development of this machine, although there is at the present time one in operation at the Royal Marsden Hospital, and another at the Westminster Hospital.

The linear accelerator if considered in the simplest terms involves the acceleration of electrons along a hollow wave guide, by the influence of an accelerating electrical field, produced by a radio-frequency supply. There are four 4 MeV linear accelerators in clinical use in this country, in addition to the 8 MeV accelerator which began operating in 1953 at the Hammersmith Hospital. The linear accelerator holds a place in the major radiotherapy centres, but unfortunately the heavy initial expense will preclude its adoption by most centres. The high output from an accelerator is regarded as a very favourable characteristic. The treatment time may therefore be reduced to a few seconds or minutes, but the time taken to set up the patient—5 to 10 minutes—cannot be reduced without sacrificing accuracy. It is this fact which will decide the number of patients treated daily.

At an early stage, the penetrating quality of the gamma rays from radium attracted physicists, who in time amassed large quantities—up to 5 and 10 grms.—in the radium "bomb." The low dose rate (the dose rate ratio for a radium bomb and an accelerator is 1:150), the dearth of this naturally occurring radioactive element, and its great expense were the reasons for the small number of radium bombs in clinical use. Radioactive cobalt has proved an excellent substitute for radium. When equivalent amounts are compared the dose rate from cobalt is found to be nearly 1.6 times as great. The source size has increased from the 10 grm. radium bomb, which is equivalent to 10 Curies, to 2,000 Curies in the present-day cobalt unit. This great increase of source strength permits a treatment distance of 50 to 70 cms. which should be contrasted with the 10 cms. distance between the skin and the radium source in the old-fashioned radium bomb. This point is readily appreciated when setting up the patient, for the cobalt unit is more manoeuvreable. It was difficult to approach the cervical region with a short-distance radium bomb, especially in a heavily-built man with a short neck. The longer treatment distance holds a further advantage for the depth dose is strikingly increased.

The cobalt unit, which is equivalent to a 2.4 million volt x-ray machine, is destined to become the most widely used megavoltage apparatus in this country and Canada. Its simplicity of design and robust qualities have won over many radiotherapists. Sixteen months ago the Governors of the London Clinic and Dr. W. M. Levitt suggested that selected patients from St. Bartholomew's Hospital should be treated on the cobalt unit at the London Clinc. This unit, which in fact was their prototype, was installed by Nuclear Engineering. There are two major problems to solve in the construction of a cobalt unit—the protection of the personnel from the gamma radiation from the source, and the design of a diaphragm which will delineate the beam, thus giving the requisite field size, without producing an embarrassingly large quantity of soft radiation. In the radium bomb the radiation hazard to the operator was successfully dealt with by keeping the source in a lead safe outside the treatment room and by transferring the radium which was held in an aluminium bobbin, by pneumatic transmission to the head, when the patient had been set up and the operator had withdrawn from the treatment room. With the cobalt unit the position is different for the source is permanently retained in the head, which must itself provide the necessary protection. When the machine is not operating the beam is shuttered by some mechanical means. A ton and a half of lead was needed to reduce the gamma ray intensity to the maximum permissible level decreed by the British Code of Practice. Needless to say, the engineering problems encountered in the movement of the head through three dimensions were magnified by the weight of the lead. The diaphragm consists of multiple sliding leaves of tungsten faced with copper sheeting. Their synchronised movement gives any choice of field from 4 x 4 cms. to 20 x 15 cms. (at a source-skin distance of 50 cms.). The cobalt source consists of six discs, each about the size of a halfpenny. If these discs were placed in a single column there would be

considerable loss of radiation from self-absorption. This difficulty was surmounted by arranging the discs in two clover leaves. The cobalt discs are made radioactive by placing them in a nuclear pile for twelve months, where they are subjected to intense neutron bombardment. The density of this neutron flux depends upon the construction and design of the pile. It so happens that in Canada and the United States of America the nuclear reactors are producing cobalt with a higher specific activity than is yet possible in this country. There are several advantages gained from loading a unit with this very hot cobalt. The physical size of the source is smaller. In consequence the amount of self-absorption is reduced and,

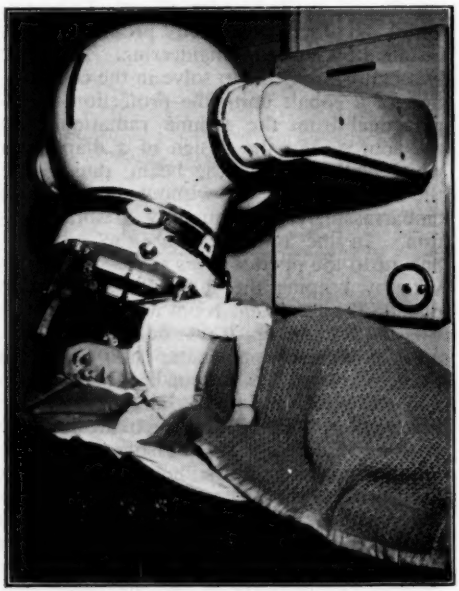


Fig. 3

more important, the penumbra of the beam after passing through the diaphragm is smaller.

The maintenance of the unit makes astonishingly few demands upon the physicist. Corrections are necessary for the decay of the source, but apart from this, faults occurring during its operation are infrequent and trivial.

In the past, megavoltage therapy has been reserved for those cases in which there is a reasonable chance that the tumour can be controlled. One notable exception to this rule was the treatment of recurrent rectal carcinomas in the Sassoon Department. Pain which is a distressing symptom in these cases can often be relieved by a six-weeks' course of supervoltage therapy. It is unlikely that the principles deciding case selection for megavoltage therapy will change appreciably, but I would regard the relief of severe pain a challenge worthy of megavoltage treatment. The pain of spinal metastases from carcinoma of the breast and bronchus can usually be relieved by deep therapy equipment, but failure is often encountered when the primary tumour belongs to the radio-resistant group. There is less likelihood of relieving the pain from breast metastases in the spine when neurological signs are present. These signs include muscle wasting and areas of altered sensation, but I would not include depression of a tendon jerk as an unfavourable sign. A further example of pain which deep therapy apparatus invariably fails to control is the involvement of a plexus—the brachial plexus in a Pancoast's tumour, and the sacral plexus from an extensive pelvic disease. Here are three instances which justify the use of megavoltage apparatus.

Both surgery and radiotherapy are local agents in the attack on cancer. The use of supervoltage apparatus in the treatment of cancer of the breast and bronchus is unlikely to yield results any better than those given by present methods, because the incidence of concealed haematogenous metastases is so high and really decides the issue. The same criticism can be levelled against the trend to extending radical surgical procedures. Radiotherapists derive more encouragement from the treatment of squamous cell carcinomas, for the successful control of such tumours is less likely to be rendered valueless by the appearance of blood-borne metastases. The battle is fought at the site of the primary tumour. Thus the fate of patients with growths of the antrum and larynx is decided by the response of the primary tumour. It is true that lymphatic invasion is a common finding with epitheliomata of the tongue, pharynx and oesophagus, but this is still a local problem. It is nearly always possible to irradiate the primary tumour and its im-

mediate lymphatic drainage area in a continuous block.

It was for these reasons that tumours which lie in the territory of the E.N.T. surgeon were selected for supervoltage treatment and over the last decade there has been a measurable improvement in the results. Now it is gradually bcoming possible to extend the field of selection to include other sites. I would give preference to three sites—carcinomas of the bladder, oesophagus and ovary. The results in the past have been very poor and surgeons hesitate to refer such cases for radiotherapy, but the routine use of megavoltage apparatus such as the cobalt unit may bring about a similar improvement.

HEPATIC COMA

by **W. H. J. SUMMERSKILL**

NEARLY 2,000 years ago, Hippocrates described the case of a young man who became severely ill with jaundice. During the terminal phase of his illness he fell to his knees, frothed at the mouth and barked like a dog before losing consciousness. This behaviour was attributed to "madness on account of the bile," and the concept that "hepatic coma" is usually fatal and results from severe liver failure has only been challenged consistently in the last decade. Nevertheless, the problem of hepatic coma had attracted the attention of such authorities as Bright, Budd, Frerichs, Osler and John Abernethy himself, and all were aware that neuro-psychiatric disorders might occur in patients with liver disease independent of jaundice or other evidence of advanced hepatic failure, and alternative liver-brain relationships were postulated.

As a result of work carried out in the United States and in this country during the past ten years, the syndrome of "hepatic coma" has been elaborated and it has become plain that this nomenclature is misleading, as loss of consciousness may not occur, and as the syndrome can develop without deterioration in liver function. Adams and Foley, in the Boston City Hospital, carefully defined the clinical syndrome, emphasising that characteristic neuropsychiatric changes may occur before consciousness is lost and that these are associated with typical alterations in the electro-encephalogram. Later work in the same hospital showed that these clinical and electroencephalographic changes could be precipitated by the oral administration of excess dietary protein, urea and ammonium salts in some patients with liver disease. Ammonia could be derived from all these substances and it therefore appeared relevant that high blood ammonia levels were later reported in patients with spontaneous "hepatic coma." An identical clinical syndrome was also described in some patients following a portocaval anastomosis, even in the absence of liver disease, a situation which is comparable to "meat intoxication" in dogs withs Eck fistulae.

These considerations indicate that nitrogenous material in the diet, the presence of a portal colateral circulation and deranged nitrogen metabolism may be implicated in the genesis of "hepatic coma," in addition to the presence of liver disease. Support for this theory came from the demonstration that protein withdrawal had a beneficial effect in patients with acute "hepatic coma"

and from the description of patients in whom chronic, fluctuating "hepatic coma" was related to the amount of protein in the diet. Such patients had an extensive portal colateral circulation but little disturbance of liver function.

Clinical Features

The neuropsychiatric syndrome of "hepatic coma" includes varied and fluctuating personality changes which may progress ultimately to loss of consciousness. In the early stages, there are characteristic

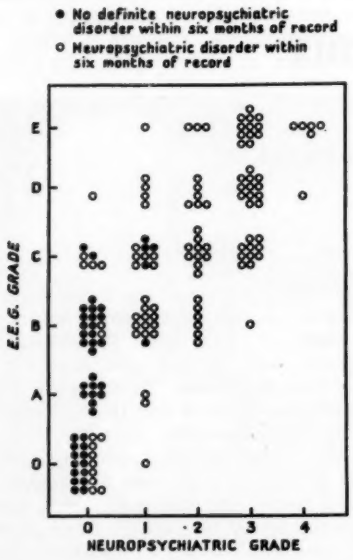


Fig. 1.

disorders of the motor system, of which a coarse "flapping" tremor of the outstretched hands, muscular rigidity, brisk tendon reflexes and ankle clonus are particularly common. These are associated with slow, slurred and impoverished speech, an altered sleep rhythm, sialorrhea and an immobile facies. Bilateral symmetrical changes occur in the E.E.G., a slow 6/second rhythm progressing to a 2/second rhythm as the condition deteriorates, but these features are not specific.

Although "hepatic coma" is usually an acute emergency following liver failure, gastro-intestinal haemorrhage or other precipitating factors, it may be present in varying degrees for weeks, months or, rarely, in patients with extensive portal colateral

DIAGNOSIS IN 110 PATIENTS IN HEPATIC COMA

CIRRHOSIS *		OTHERS	
ALCOHOLISM	56	VIRUS HEPATITIS	7
UNCERTAIN AETIOLOGY	33	ISCHAEMIC NECROSIS	3
BILIARY	4	CARCINOMATOSIS	3
HAEMOCHROMATOSIS	1	CHIARI'S SYNDROME	1
WILSON'S DISEASE	1	C cl 4 POISONING	1

*INCLUDING 3 HEPATOMA

Table 1

circulations, for years. A careful neurophychiatric assessment is therefore indicated in all patients with liver disease so that the more subtle changes are not overlooked. Moreover, in some patients, personality changes or neurological abnormalities are the predominant feature, and evidence of liver disease may be scanty. Assessment and progress in mild or equivocal cases is best judged by asking for a daily specimen of handwriting in the form of a journal, or by the daily construction of a five-pointed star. The former, by the character of the writing and by the subject matter, constitutes a valuable guide, whereas the time taken to construct the five-pointed star with matches elicits the constructional apraxia exhibited by patients with hepatic coma and other organic

FACTORS CONTRIBUTING TO HEPATIC COMA

(1) LIVER FUNCTION

"Failure"	60
"Decompensated"	39
"Compensated"	11

(2) ADDITIONAL FACTORS

MASSIVE G. I. BLEEDING	18	PARACENTESIS	6
NITROGEN INTOLERANCE	16	DRUGS	6
SURGICAL OPERATION	9	PERIPHERAL FAILURE	3
INTERCURRENT INFECTION	8	PORTAL VEIN THROMBOSIS	3
		TRAUMA	1

Table 2

dementias. Where doubt exists, the electroencephalogram is of assistance and the

degree of abnormality correlates well with the clinical severity of the condition (Fig. 1).

This evening I would like to discuss certain findings in 110 patients in hepatic coma that were studied with Dr. Sheila Sherlock at Hammersmith Hospital, with Dr. Charles Davidson at the Boston City Hospital, and with Dr F. Avery Jones at the Central Middlesex Hospital (Table I). It is plain that "hepatic coma" may complicate any type of liver disease, but the majority of cases had cirrhosis, which includes the commonest types of severe liver disease. Similarly, many factors may contribute to hepatic coma (Table 2). 60 patients were classified as being in "hepatic failure," as they had serum bilirubin values above 5 mg%, with or without ascites; 39 had "decompensated liver disease," indicating either less severe jaundice or ascites; and in 11 patients there was no clinical or biochemical evidence of jaundice and no ascites was present. Severe derangement of liver function is not therefore necessary for the production of "hepatic coma." Factors frequently precipitating coma included massive gastro-intestinal bleeding, usually from oesophago-gastric varices, and intolerance of nitrogenous substances, either high protein diets or "therapeutic" agents, such as methionine and ammonium chloride. Several other factors, however, were occasionally responsible, thus emphasising that many patients with liver diseases are so delicately poised that minor adversity may precipitate neuropsychiatric disturbance.

TABLE 3

PROTEIN ADMINISTRATION

	Total	Survived	Died	
			Total	Temporary Improvement
All Patients	30	2	28	7
+ Glutamic Acid	10	-	10	3
+ Lipoic Acid	5	1	4	-
+ Cortisone	10	1	9	4

Table 3

PROTEIN DEPRIVATION AND ANTIBIOTICS

	Total	Survived	Died	
			Total	Temporary Improvement
All Patients	88	42	46	28
+ Glutamic Acid	17	3	13	-
+ Aspartic Acid	3	-	3	1
+ Lipoic Acid	6	-	6	-
+ Cortisone	6	-	6	-

Table 4

The Metabolic Basis of Hepatic Coma

In view of the varied clinical manifestations and precipitating factors in hepatic coma and the multiple functions of the liver, it is hard to conceive that any single biochemical disturbance could account for the disorder. Evidence accumulates, however, to incriminate ammonia intoxication as one important causal factor. Ammonia is derived from nitrogenous contents of the diet by bacterial and non-bacterial enzyme activity in the intestines, and levels in portal vein blood are high. In the normal subject, this ammonia is metabolised to urea in the liver by the Krebs cycle, and little ammonia escapes into the peripheral circulation. In contrast, studies in patients with liver diseases have shown that peripheral blood ammonia levels often become raised, and that two mechanisms contribute to this. Impaired metabolism by a diseased liver may permit ammonia to reach the peripheral vessels through the hepatic veins, while the presence of portal collateral vessels may shunt portal blood, rich in ammonia, directly to the systemic circulation. This is illustrated by

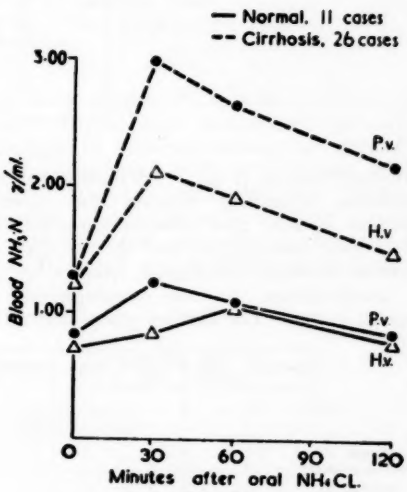


Fig. 2

serial hepatic and peripheral venous blood ammonia estimations during hepatic vein catheterisation after an oral dose of ammonium chloride (Fig. 2). By these routes, ammonia ultimately reaches the central nervous system and clinical observations relate both liver disease and the presence of a portal colateral circulation, either alone or in combination, to the development of hepatic coma. The further investigation of

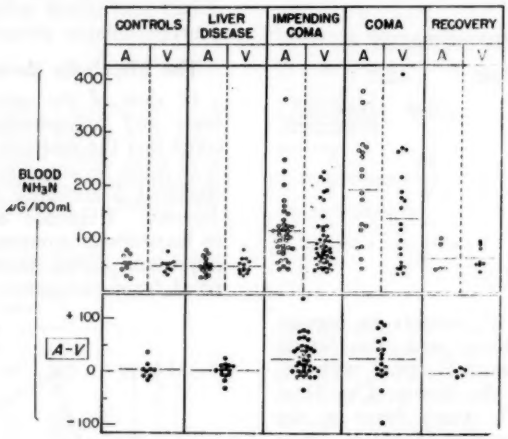


Fig. 3

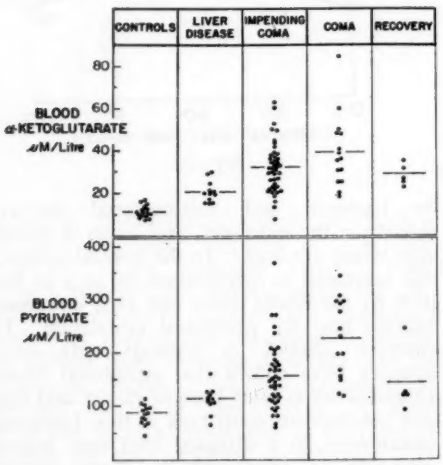


Fig. 4

the relationship between deranged ammonia metabolism and " hepatic coma " illustrates the complex demands of clinical research and certain aspects are worth emphasis.

In patients with uncomplicated liver disease, peripheral blood ammonia levels may fluctuate in relation to dietary nitrogen intake, but they are within the normal range in the fasting state. In contrast, patients with hepatic coma frequently, but not invariably, have high peripheral blood ammonia levels (Fig 3) and values are higher in the artery than in the vein. This arterial-venous ammonia difference occurs both at the periphery and in the brain, suggesting that ammonia is taken up both by the peripheral tissues and by the central nervous system, but the " efficiency " of such ammonia utilisation is impaired in patients in hepatic coma, sometimes to the extent that there is no significant arterial-venous ammonia difference. Two factors must therefore be taken into account when considering any causal relationship between ammonia intoxication and hepatic coma, namely the actual height of the arterial ammonia concentration and also the efficiency of its removal from the blood, as shown by the arterial-venous difference. Thus, if the arterial level is very high, or if utilisation by various tissues is impaired, intracellular ammonia intoxication in the brain may occur. The relatively normal blood ammonia concentrations in some patients with hepatic coma, and the imperfect relationship between arterial, venous or cerebro-spinal fluid ammonia concentration and the degree of coma or E.E.G. abnormality, may to

some extent, be explained on this basis. In addition, the potential toxicity of ammonia may be affected by blood pH and oxygen saturation.

the entire sequence of these biochemical changes, with their relationship to neuropsychiatric disorder, is shown in Fig. 5. Following the oral administration of am-

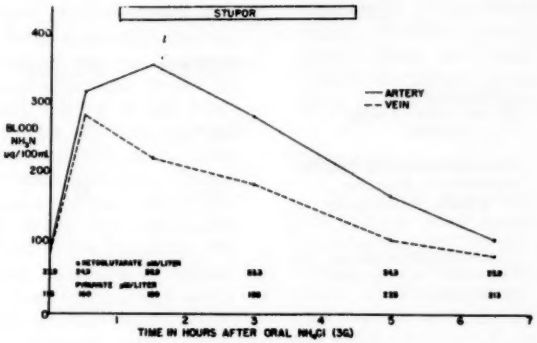


Fig. 5

High levels of blood ∝-ketoglurate and blood pyruvate occur in hepatic coma (Fig. 4) and these are compatible with a defect in intramediary metabolism, particularly in final glucose oxidation in the citric acid cycle. The abnormal blood keto-acid concentrations can be related, at least in part, to deranged ammonia metabolism by the

monium chloride (3.0g.) in a patient with liver disease and intermittent personality changes of uncertain nature, an immediate rise occurred in both arterial and venous blood ammonia concentrations. Initially, despite a high arterial level, there was little tissue uptake of ammonia, as shown by the small arterial-venous difference, and shortly

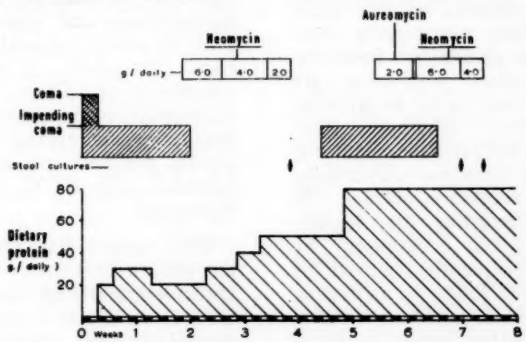


Fig. 6

intravenous infusion of ammonium chloride in patients with liver disease and in control subjects. In the latter, no appreciable alteration in keto-acid levels occurs following ammonium chloride infusions, but in patients with liver disease there is an immediate rise in blood pyruvate and, to a lesser extent, in blood ∝-ketoglurate concentrations. These findings can be explained on the basis of depression of intermediary metabolism by ammonia intoxication, and

afterwards the patient developed transient hepatic coma. Subsequently, tissue utilisation of ammonia improved, arterial and venous ammonia levels fell, and the patient returned to normal consciousness. During the infusion, there was a striking increase in blood pyruvate concentration and a small elevation in the blood ∝-ketoglurate level. Ammonia, which can be derived from the various nitrogenous substances shown to precipitate "hepatic coma," can therefore

account for many of the clinical, E.E.G. and biochemical features of the syndrome. Additional factors are doubtless important, although at present less clearly defined.

PROGNOSIS IN HEPATIC COMA

	PATIENTS	SURVIVAL
LIVER FAILURE (S. Bilirubin > 5 mg% ± Ascites)	60	8
DECOMPENSATED LIVER DISEASE (S. Bilirubin 1 - 5 mg% + Ascities)	39	25
COMPENSATED LIVER DISEASE (No Ascites or Jaundice)	11	11
Total	110	44

Table 5

Treatment

The contribution of ammonia, and possibly other nitrogenous substances originating from the intestines, in the genesis of "hepatic coma" is sufficiently well accepted for treatment to be planned on this basis. Protein and any other nitrogenous compounds are therefore eliminated from the diet, and broad-spectrum antibiotics are given by mouth to reduce, as far as possible, the production of toxic substances from nitrogenous matter in the intestines. Material already present in the intestines is evacuated by purgation and, if necessary, enemas. In this respect, it is interesting that hepatic coma has been provoked occasionally by constipation and subsequently relieved by evacuation of the bowels following an enema. In the absence of protein, nutrition is maintained with glucose, given either by intragastric or intravenous drip. To this basic regime must be added specific treatment of any cause which can be found for the precipitation of coma. This may involve the passage of a Sengstaken-Blakemore tube, or even surgical operation, to arrest bleeding from gastro-oesophageal varices; the treatment of intercurrent infection; the administration of steroid drugs to patients with severe hepatitis, or other measures. In acute hepatic coma, complete protein deprivation is indicated until consciousness returns. Subsequently, 10 g. supplements of protein should be added on alternate days, unless deterioration dictates a return to the earlier regime, until the diet is normal.

The regimen of protein withdrawal, enemata and oral broad spectrum antibiotics is sometimes indicated as a prophylactic measure in circumstances under which coma may reasonably be anticipated. This applies especially to patients with gastro-intestinal haemorrhage and jaundice or ascites, and prior to general anaesthesia with major surgery, particularly if portal-systemic shunt procedures are planned. The likelihood of neuropsychiatric complications after such operations has resulted in the suggestion that careful pre-operative assessment of protein tolerance, with E.E.G. control is a necessary precaution.

This regime has improved considerably the results of therapy in "hepatic coma." Direct comparisons are notoriously unreliable, especially in a condition with so many possible causes, but experiences in the Boston City Hospital on similar groups of patients, managed under identical circumstances, are relevant. The first group were treated with various agents, but protein withdrawal and broad-spectrum antibiotics were not employed. Of 30 patients, 2 survived and 7 showed temporary improvement (Table 3), results in keeping with more general experience at the time. A second group of 30 patients in the same hospital had a 40% recovery rate when treated with antibiotics and protein withdrawal, and ad-

ditional experience with this management (Table 4) has confirmed these results.

In neither group was there any striking response to certain drugs recommended in hepatic coma. Glutamic acid and aspartic acid were initially used because they can take up ammonia to form glutamine and asparagine, and their lack of success in larger series of cases has been attributed to the instability and temporary nature of the reaction. Lipoic acid assists the transfer of pyruvate into the tricarboxylic acid cycle, but has now been abandoned, as a therapeutic agent in hepatic coma. A.C.T.H. and adrenal steroid drugs are invaluable when coma complicates acute hepatitis, but their action on hepatic function is seldom sufficient to influence the issue when coma is associated with more chronic liver disease. Recently there have been encouraging reports on the efficacy of arginine in small series of cases, but it is difficult to understand how this enzyme can significantly improve the metabolism of ammonia to urea in the liver in the presence of hepatocellular failure.

The antibiotic used in the majority of these patients was chlortetracycline (2.0g/daily), a drug which was shown to protect patients with liver disease from an oral nitrogen load which had previously induced neuropsychiatric deterioration. However, the action of chlortetracycline on the intestinal flora was relatively unimpressive in patients with liver disease and, following a report by Fisher and Faloon, Neomycin was substituted. This drug " sterilises " the stools within 48 hours in doses of 2.0g. t.d.s. Not only did it produce clinical improvement in patients already receiving chlortetracycline, but a protein intake of 20-40g. daily was compatible with recovery from coma (Fig. 6). Temporary protein withdrawal is harmless in the majority of patients, but it may be an adverse factor in subjects with liver disease associated with malnutrition, such as cirrhosis in the alcoholic, or when coma is prolonged. Neomycin is therefore the drug of choice and further studies may demonstrate that it often renders protein withdrawal unnecessary. Neomycin does not affect nitrogen balance, but chlortetracycline has the disadvantage of causing increased nitrogen catabolism by a mechanism which remains unsolved.

Biochemical studies during the course of protein deprivation and antibiotic therapy in hepatic coma have shown that this regimen results in a fall in blood ammonia levels in the mapority of instances and that such a response is of favourable prognostic significance. Protein withdrawal alone has a similar effect on blood amonia levels and Neomycin permits protein to be given without a rise in blood ammonia levels.

Prognosis

The most important factor influencing prognosis is liver function, and coma complicating hepatic failure is an ominous event (Table 5). When coma occurs in the absence of any apparent precipitating factor, the outlook is less satisfactory than when the disorder follows gastro-intestinal bleeding or some other catastrophe amenable to therapy. Cirrhosis in the alcoholic is more difficult to treat than other types of cirrhosis because of the greater frequency of hepatic failure and the associated nutritional defects. Somewhat surprisingly, the depth of coma at the time treatment is initiated has little relationship to the outcome, but the duration of coma is important and failure to recover after 7 days' treatment is particularly grave.

" Chronic Hepatic Coma "

Recently a group of patients have been described in whom the characteristic syndrome of hepatic coma presents as a chronic fluctuating neuropsychiatric disturbance which may continue for years. Although relatively rare, such patients are important, as they provide information relevant to the understanding of " acute hepatic coma," and also because the predominance of nervous disorder sometimes results in them being treated as hopeless psychiatric or neurological cases.

The 17 patients studied in this group all had certain features in common. Clinical or biochemical evidence of liver disease was usually scanty, thus accounting, perhaps, for their long course. All had splenomegaly and hepatic fetor, suggesting the presence of a portal colateral circulation, although the demonstration of portal hypertension by the radiological demonstration of varices or the presence of elevated intrasplenic or occluded hepatic vein pressures was relatively un-

rewarding. However, radiological definition of the portal circulation by transplenic portal venography revealed the presence of a very extensive portal circulation in every patient. Portal vein thrombosis was most commonly associated with the syndrome, but a patent umbilical vein, massive enlargement of the inferior mesenteric vein or multiple smaller channels was sometimes found. The same syndrome occasionally follows surgical construction of a portalcaval anastomosis.

As with patients in acute hepatic coma, the degree of neuropsychiatric disorder was related to the amount of nitrogen in the diet, a situation similar to meat intoxication in the Eck fistulae dog and due to the shunting of toxic nitrogenous substances from the intestines direct to the systemic circulation through portal collateral vessels. Dramatic improvement followed restriction of dietary protein, patients previously under restraint at home or in mental hospitals being able to resume relatively normal lives. In most instances a diet containing 50 g. protein was compatible with mental and nitrogenous equilibrium. More severely affected patients required greater restriction, with a consequently poorer prognosis, but the addition of daily Neomycin may improve protein tolerance in such cases.

In conclusion, there follows a list of general references; followed by a list of references to the work discussed this evening. The latter includes the names of those with whom it has been my great pleasure and privilege to co-operate over the years in this study and I gladly acknowledge my debt to them.

Figures

Fig. 1

Independent clinical assessement and E.E.G. grade of severity in hepatic coma.

Fig. 2

Ammonia tolerance in control subjects and patients with liver disease. H.V.=Hepatic vein; P.V. = Peripheral vein.

Fig. 3

Arterial and peripheral venous blood ammonia levels in patients with liver disease, with and without hepatic coma, and in control subjects.

Fig. 4

Blood ∝-ketoglutarate and pyruvate concentrations in control subjects and patients with liver disease, with and without hepatic coma.

Fig. 5

Neuropsychiatic state, arterial and peripheral venous ammonia levels and blood pyruvate and ∝-ketoglurate concentrations after ammonium chloride administration in a patient with liver disease.

Fig. 6

Neuropsychiatric state and protein intake in relation to therapy with Neomycin and Aureomycin in hepatic coma.

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EXAMINATION RESULTS

UNIVERSITY OF LONDON

Special Second Examination for Medical Degrees, March, 1958.

Al-Khedheri, S.	Kajtar, T.
Banky, E. J.	Macdonald, A.-M. E.
Beckett, P. R.	Orr, M. M.
Bootes, J. A. H.	Perriss, B. W.
Collingwood, R. E.	Shaw, A. B.
Drake, R. M.	Telfer, A. C.
France, R.	Visick, J. H.
Hall, J. M.	Anthony, P. P.
Janosi, M.	Barton, M. T.
Lines, A. J.	Bonn, A. J.
Millington, M.	Christian, P. B.
Pagan, W. H.	Davies, N. M.
Shand, D. G.	Fell, R. H.
Stone, B. E.	Gill, B. V.
Thomson, W. H. F.	Hore, B. D.
Amponsah, F. I.	Knight, C. R.
Banky, P. I.	Manchester, K.
Bishop, M. B. J.	Padfield, A.
Boothroyd Brooks B. G.	Russell, A. L.
Davies, J. D.	Shaw, B. N.
Edmondson, R. S.	Therkildsden, L. K. H.
Gandy, R. H.	Weeks, S. K.
Herbert, D. C.	

UNIVERSITY OF OXFORD

SECOND B.M. EXAMINATION

HILARY TERM, 1958

Forensic Medicine & Public Health

Burfoot, M. F.	Chong, J. K. K.-H.
Cook, R. C.	McMaster, A. B. M.
Price, J. S.	Silverstone, J. T.
Smith, R. G. L.	Woolrych, M. E.

Special & Clinical Pathology

Chong, J. K. K.-H.	Smith, R. G. L.
McMaster, A. B. M.	Cook, R. C.
Silverstone, J. T.	Price, J. S.
Woolrych, M. E.	

The following completed the examination for the Degree B.M., B.Ch.:—

Burfoot, M. F.

CONJOINT BOARD

FIRST EXAMINATION

MARCH, 1958

Pharmacology

Gould, A. M.	Patterson, M. J. L.
Wills, G. T.	Birt, A. M.
Dymond, G. S.	Bonner-Morgan R. P.

FINAL EXAMINATION, APRIL, 1958

Pathology

Stephenson, C. G.	Gould, A. M.
Seeman, H. M. I.	Bannerman-Lloyd, F.
Price D. J,	Simpson, R. I. D.
Cawley, M. I. D.	Pilkington, R.
Ridsdill-Smith, R. M.	Davies, D. J. C.
MacAdam, D. B.	

Medicine

Rowlands, D. F.	Bench, J. T.
Martin, J.	Hedley-Whyte, J.
Farrow, L. J.	Ridsdill-Smith, R. M.
Ball, P. J.	Farren, P.
Stephenson, C. G.	Matthews, T. S.

Surgery

Stephenson, C. G.	Godrich, J. E.
Farren, P.	Bench, J. T.
Savage, D. C. L.	Yip, S. Y.
Martin, J.	
MacAdam, D. B.	

Midwifery

Rowlands, D. F.	Farrow, L. J.
Farren, P.	Bench, J. T.
Ellison, A. J. H.	Simpson, R. I. D.
Martin, J.	

The following candidates have completed the examination for the Diplomas, M.R.C.S., L.R.C.P.:

Stephenson, C. G.	Martin, J.	Bench, J. T.
Farren, P.	Yip, S. Y.	Godrich, J. E.

SPORTS NEWS

Viewpoint

IT is hoped, having been both the awarder and the receiver of colours and honours, that a few remarks on the subject will not cause offence. What follows is not intended as criticism, merely soliloquy, written for want of anything better to say.

The award of colours is purely the responsibility of the various clubs. It is probably true to state that in general they are given for a full season's play in the first team. Should this automatically be the case? Obviously, with those such as the Rugger club, where a place in the first XV is a coveted honour, the answer is yes. Not in all, however, is such a position as difficult to attain. It would seem at least a pity, if not wrong, that from these the same honours can be obtained for less meritorious effort.

Perhaps the existing order of things is the only one which allows for recognition of services rendered. One club, though, has overcome the difficulty by introducing its own tie for just such a purpose.

If these colours mark service to the club as opposed to distinctive performance, a state of affairs to which probably few objections are valid, what criteria should govern the award of honours. Here again the responsibility devolves on the club, for although such an award is theoretically the prerogative of the Students' Union council on the recommendation of the club, in fact there is no recent record of such a recommendation being rejected. Is the criterion here to be similar but more prolonged service, or is the award to be reserved for truly outstanding performance? The latter would seem preferable, the former more common. It may be thought that one club, which although active, did not recommend the award of honours for a period of five years, was too strict. Was it?

SPORTS CALENDAR

June

Wednesday, 4th
Golf v. King's College at South Herts.
Saturday, 7th
Tennis v. St. Thomas' (H).
Sports Day.
Wednesday, 11th
Golf v. U.C.H. at South Herts.
Saturday, 14th
Tennis v. St. George's (A).
Sunday, 15th
Cricket v. Horlick's (A). Start 11.30.
Wednesday, 18th
Golf v. U.C. at Stanmore.
Saturday, 21st
Cricket v. Royal Dental and Charing Cross Hospital (H). Start 2.30.
Tennis v. U.C.H. (A.).
Sunday, 22nd
Cricket v. O. Cholmeleians (H). Start 11.30.
Saturday, 28th
Tennis v. Middlesex (H).
Cricket v. Jesters (H). Start 2.30.
Sunday, 29th
Cricket v. Old Roans (H). Start 11.30.

July

Wednesday, 2nd
Golf v. U.C.H. at Denham.
Saturday, 5th
Cricket v. U.C.S. Old Boys (H). Start 2.30.
Tennis v. Dulwich School (H).
Sunday, 6th
Cricket: Past v. Present (H). Start 11.30.
Wednesday, 9th
Golf v. St. Thomas' at West Hill.
Saturday, 12th
Cricket v. Incogniti (H). Start 11.30.
Tennis v. London Hospital (H).
Sunday, 13th
Cricket v. Hampstead (H). Start 11.30.
Wednesday, 16th
Golf v. Guy's at South Herts.
Saturday, 19th
Cricket v. Nomads (H). Start 2.30.
Sunday, 20th
Cricket v. Dartford (H). Start 11.30.
Wednesday, 23rd
Golf v. Middlesex Hospital at South Herts.
Tennis v. R.M.A., Sandhurst (H).
Saturday, 26th
Tennis v. K.C.H. (A).
Sunday, 27th
Cricket v. R.N.V.R. (H). Start 11.30.
Wednesday, 30th
Golf v. K.C.H. at Dulwich.
Tennis v. West Heath (A).

SAILING CLUB

An apology is offered to the Sailing Club for not having included them in the list of club officers published earlier. The Secretary this year is M. Bunnemeyer.

SQUASH

Junior Inter-Hospitals Cup Final. Bart's v. Guy's. Lost 4–1.

The 2nd Team went a long way to fulfilling the hope that they would do well in the competition

this year, by reaching the final. Here they encountered, and met their match in the holders, Guy's. The match was played on Monday, March 17th, on the very fast U.C.H. courts. This may or may not have been to our advantage.

The strength of the opposition did not cause any surprise. Guy's 1st side would probably beat most university teams, and one or two of our opponents would be an asset to most other hospital 1sts.

On the whole all the side played well, and early on there was a slight chance of a surprise win. It was thought that the match would probably be won or lost by the lower numbers, and so it proved. On court first were Seaton at No. 3, and Nouri at No. 4. The former played steadily in losing, but put down one or two vital shots. The latter fought very hard, but was unable to clinch the match, and finally went down when he developed cramp in the 5th game. He must have felt very frustrated to lose, for a few more killing shots would have settled the matter in the previous game.

Haslam at No. 1 followed Seaton, and proceeded to play well above himself. He came close to what would have been the best result of the evening. He seemed hovewer to lose heart when told before the last game that the match was already lost. The courts seemed to suit his style, and his was certainly the most intelligent squash in the side. He played with a certain finesse the others lacked.

Meanwhile on the other court, Bowles at No. 2 suffered a rather quicker defeat. He appeared never quite to get the pace of the court against an opponent who started well. He is not the first to whom this has happened.

It remained for Sugden at No. 5 to achieve Bart's only win. After trailing disastrously at 2-0 very quickly he improved sufficiently to win 3-2. The squash was not outstanding, and his win was due mainly to the power of his well exploited fore-hand smash.

A general impression was that the Bart's players were inclined to be content with getting the ball up. Had they hit a little lower and harder, the result might have been different. However may we congratulate our very sporting opponents, and hope we will again be in the final next year to take the cup from them.

SQUASH RETROSPECT

The season followed the course predicted at its beginning, namely a weak first team winning more matches than last year and a strong second V winning most of its matches.

We were glad to welcome The Jesters, The B.B.C. and the Inter-Varsity Club as new opponents, as well as several new second five fixtures.

A printed fixture card proved an essential and long overdue innovation.

A match against St. Catherine's College gave us an excuse to go to Cambridge which we hope to make an annual event with a return game after the Varsity rugger match.

At first string T. B. Duff has fearlessly, though not always victoriously, faced a savage onslaught from Blues, internationals and other distinguished company, whilst the indefatigable Randle has run to ground several technically superior opponents.

The credit of the season must go to the second team in reaching the final of the Hospitals Junior Teams cup in which they lost to a strong Guy's team, having defeated St. Thomas's and St. Mary's on the way. Throughout the season J. Sugden has been the mainstay of the team both on and off the court.

The season ended with the Staff match in which we avenged last year's defeat. We are grateful to Dr. Shooter and his team for the enjoyable entertainment which they provided afterwards.

Colours

The Captain has awarded the following players their colours for this season: T. C. Hindson, D. Lyon, G. Randle, K. Bowles, and D. Godwin.

RUGBY FIVES CLUB

End of Season Report

With a return match v. the Rugby Fives Association Club last Saturday (8th March), the Fives season as far as Bart's is concerned, ended.

Our first season has shown quite good promise. Only the secretary M. T. Haslam will have left next year, the rest of the team still being present. The team hopes to use Hampstead courts if the Bart's court has by then been commandeered.

Regular members of the team were :

T. C. Hindson (Capt.), D. A. Birkett, M. T. Haslam.

K. MacKenzie-Ross, R. Fell and N. Smyth also played. T. C. Hindson awarded colours to D. A. Birkett and M. T. Haslam.

Match Record :

Won v.	Clove Club	79—77
v.	Old Thorntonians	103—75
v.	Emmanuel College, Cambridge	104—69
Lost to	R.F.A. Club	71—117
	and	69— 97
	Westminster Bank	82—102
	Clare College, Cambridge	90—120
	Old Strandian's (1 pair match)	60— 12

Matches v. College of St. Mark and St. John and a return v. Old Strandian's were cancelled.

FENCING

The club has recently completed a more active if not more successful season than of recent years. Since the departure three years ago of several experienced fencers headed by Nye, who won a University Championship, we have had to rely almost entirely on members who only took up the sport at Bart's. This year, having previously acquired something of the art of fencing, they have been arduously learning the equally difficult one of fighting, a very different technique. On the whole, the results have been encouraging.

The Captain, McGrath, can look back with satis-

faction on a successful season as such. For he has been almost entirely responsible for the club's increased activity, having almost doubled the fixture list. His results in matches have been a little disappointing, but his previous lack of match practice must be remembered. He seems now to be gaining confidence in his ability to win, and next season should do so more consistently.

The Secretary, Parker, is an exception in that he had considerable experience before reaching us. He is always useful as a match winner, and his results have been good, if not quite as good as last year. For, although he has a beautiful style, some lack of practice has taken the edge off his fighting.

Thompson is another who is Bart's trained. His fighting is forceful rather than stylish, but has been quite effective. Some reduction in the width of his movements and a steadying of the point of his blade would help him.

Townsend has a more pleasing style than our other fencers, excepting Parker, but he has not yet had much match experience. His attacks have consequently not yet acquired the penetration they need. A further season should make him much more consistent.

Our best results this year have come from Sugden, last year's captain, for he has lost only four fights in ten matches. He has a rather untidy style, being a good fighter rather than a good fencer. He again fights with too much force, and width of movement, but his unorthodox attacks coupled with speed and the steadiness of his point, have baffled many opponents. There has probably been an element of luck in his results being quite so good.

Since last writing two matches have been fought. The results were:—

4 Foil v. Imperial College (A): Lost 14—2.
3 F.S. v. Guys (A): Foil won 6-3. Sabre lost 4-5.
These bring the season's totals to:—
Foil: Fought 12, Drawn 1, Won 6.
Sabre: Fought 5, Won 2.

Colours

Honours have been awarded to K. J. Sugden, and Colours to J. Parker and A. J. Thompson for their services this season.

LAWN TENNIS

As usual, the season began with a trial on the not too good Charterhouse courts. The attendance was encouraging, especially by pre-clinicals, and new blood from Cambridge.

The first fixture of the season (a new one) against London House, was cancelled because of rain. The first one played, also a new fixture against the London School of Pharmacy, proved little more than a practice, and they were defeated 8—1, with the loss of only 3 sets. The Chislehurst courts were a delight to play on.

With the continuance of the fine weather the next match was played against Westminster, again being won 8—1. In each of these two matches the only defeats were of the Bart's 3rd pair playing our opponents' 1st pair.

The next matches are against Charing Cross and the Royal Dental Hospital, and against Keble College, Oxford. For these we hope to call on last year's captain, now qualified, in preparation for the match against Guy's in the United Hospitals doubles tournament. Guy's have held the cup for the past seven years, and we hope they may at last be deposed.

CRICKET

1st XI v. London House at Chislehurst, Sunday, April 27th. Match drawn.

Bart's 169—4 dec. (Merry 37, Funseta 32, Mitchell 30*, Abell 29*).
London House 161—9 (Harvey 4-42, Garrod 3-61).

This season many of last year's regulars will not be playing due to examination commitments. Despite this, the Hospital, batting first, scored well against mediocre bowling. Two newcomers, Merry and Funseta were impressive with their attacking stroke play. The Hospital declared, leaving London House to score 170 in just over two hours. The main brunt of the bowling was borne by Garrod and Harvey, and with a little more accuracy, and a much higher standard of fielding, the match could easily have been won. A fine hard-hitting innings, and obstinacy by the later batsmen, however, denied the Hospital victory.

1st XI v. University College Hospital at Mill Hill, Saturday, May 3rd.

U.C.H. 43 (Garrod 5-6, Harvey 4-17).
Bart's 44—2.

Against a very weak batting side the opening attack of Garrod and Harvey found little difficulty in dismissing U.C.H. in just over an hour. Once again the standard of the Bart's fielding left much to be desired. One bright feature was a brilliant diving catch by Pagan in the gulley. The Hospital had no trouble in scoring the necessary runs for the loss of 2 wickets.

1st XI v. Putney Eccentrics at Chislehurst, Sunday, May 4th. Match lost by 56 runs.

Putney Eccentrics 203 (Johnson 96), Juniper 4-48, Pagan 4-36).
Barts' 147 (Abel 51, Robson 24*).

On a perfect day for cricket, and with an easy paced wicket, Putney won the toss, and elected to bat first. Accurate bowling and improved "ground" fielding prevented the batsmen scoring quickly, but several catches were put down. After lunch several batsmen forfeited their wickets by attempting to force the pace against the slow bowling of Pagan and Juniper. Pagan, bowling a succession of proved the more effective.

After a long day in the field, the earlier batsmen lacked concentration, and 4 wickets fell for 33 balls of variable width and length, surprisingly runs. Abell proceeded to play an attacking innings of 51 with good support from the middle order batsmen, especially Robson, who was undefeated with 24 at the close.

BRIDGE

Bridge, although for long played by numerous schools in the A.R. has not until recently been taken too seriously at Bart's. This year however, for the first time, a team from the Hospital entered for the Interhospitals competition, and have so far enjoyed particular success. They have now reached the final, having played and won three preliminary rounds.

In the first round they met a relatively weak team from the Royal Free who they beat by the considerable margin of 62 match points. Next followed a match against the holder, the London. They again were convincingly, if not so spectacularly beaten by 28 match points.

Lastly came a very close match against King's College Hospital, who were just beaten by 5 points after a half way deficit of 4.

The duplicate pairs system on which all these matches are played makes for very exciting play to watch. Each set of hands is first played, and then defended by pairs of the same team at different tables. One hand in the match against King's demonstrated this well. At one table the Bart's pair bid and made 7 Hearts, with little bidding from the opposition. At the other table the King's pair only bid the same hands to 6 Hearts, largely on account of extensive nuisance bidding by the defenders.

On Friday, March 14th, Bart's played Guy's in the final of the Inter-hospitals Bridge cup. This mach was played over 32 boards, 4 more than in the earlier rounds, and Bart's won by 28 match points.

This was not the most difficult of the matches played, and the result was in little doubt when Bart's led by 41 match points half way through.

The winning of this cup, in fact a rather handsome Rose-bowl, at the first attempt was a fine effort. May we congratulate the team, which throughout has been: A. W. Gould, and G. F. Abercrombie. M. J. Tyrrell, and J. M. Laurent.

RIFLE CLUB

The following are the results of smallbore competition shooting undertaken by the Rifle Club during the 1957-58 winter season:—

U.H. Lloyd Cup Competition (Inter-Hospital League)

Round 1.—v. St. George's: Won 485/475.
Round 2.—v. Westminster: Lost 482/491..
Round 3. v. Guy's A.: Won 490/489.
Round 4.—v. St. Mary's: Won 488/485.
Round 5.—v. London: Lost 488/489.
Round 6.—v. Guy's B: Won 482/472.
Round 7.—v. St. Thomas's: Won 489/473.

Final Order: 1 Westminster, 2 St. Bartholomew's, 3 London, 4 Guy's A, 5 St. Mary's, 6 St. Thomas's, 7 Guy's B, 8 St. George's.

U.H. Tyro League, Division I (Clinical)

Round 1.—v. London: Lost 366/458.
Round 2.—v. St. Mary's: Won 482/455.
Round 3.—v. Westminster: Lost 475/477.
Round 4.—v. St. Bart's (Pre-clin.): Lost 382/476.
Round 5.—v. St. Thomas's: Won 483/450.

Final Order: 1 London, 2, St. Mary's, 3 Westminster, 4 St. Bartholomew's, 5 St. Thomas's.

U.H. Tyro League, Division 2 (Pre-clinical)

Round 1.—v. St. Mary's: Won 483/426.
Round 2.—v. Guy's: Won 469/366.
Round 3.—v. London: Lost 478/481.
Round 4.—v. St. Bart's (Clinical): Won 476/382.
Round 5.—v. St. George's: Lost 466/468.

Final Order: 1 St. George's, 2 London, 3 St. Bartholomew's, 4 St. Mary's, 5 Guy's.

University of London Inter-Collegiate Pistol League, Division 2

Round 1.—Bye
Round 2.—v. Queen Mary Coll.: Won 399/344.
Round 3.—v. Imperial College : Won 445/407.
Round 4.—v. Northampton Engineering Coll.: Won 475/396.
Round 5.—v. King's College: Won 449/380.

Final Order : 1 St. Bartholomew's, 2 Imperial College, 3 Q.M.C., 4 Northampton Engineering Coll., 5 King's College.

U.L. Standing and Kneeling League, Division 2

Round 1.—v. Queen Mary College C: Lost 229/273.
Round 2.—v. St. George's Hospital: Won 228/220.
Round 3.—v. Queen Mary College B: Lost 260/322.
Round 4.—Bye.
Round 5.—v. University College: Lost 235/279.
Round 6.—v. London Hospital: Won 267/220.
Round 7.—v. King's College: Lost 267/276.

Final Order: 1 Q.M.C. B, 2 University College, 3 Q.M.C. C, 4 King's College, 5 St. Bartholomew's, 6 St. George's, 7 London.

U.H. Individual Competition

Class A (Average above 96).—G. R. Hobday placed 2nd, R. P. Ellis 3rd.
Class B (Average above 93).—R. B. Church placed 3rd.

Friendly Matches

Nov. 15th.—v. Westminster: Won 573/568.
Feb. 26th.—v. Guy's: Won 573/559.
Mar. 10th.—v. St. Mary's: Won 583/558.
Mar. 10th.—v. Alderbarts: Won 570/544.
Mar. 21st.—v. London: Won 1062/1042.

Club colours were awarded to R. B. Church for consistent shooting in the Lloyd Cup competition.

The Club is once again grateful to Dr. Francis for his kind gift of spoons for the monthly competitions.

The Committee are pleased to announce that Mr. E. A. J. Alment has accepted their invitation to become a Vice-President of the Club.

BOOK REVIEWS

CHILD HEALTH AND PAEDIATRICS *by* R. McL. Todd. Published by Heinemann, Medical Books Limited. Price 21/-.

To be asked to review this book, together with the City of London Health Visitor, who not only geographically exists in Bart's Out-Patients Department, but who is becoming more and more firmly installed in the minds of Bart's . . . as "Bart's Health Visitor" . . . is pleasant, for it shows an ever-increasing interest in the healthy child growing in our midst, but most pleasant of all is the book itself.

It is a most remarkable book in many ways. It covers a great deal of ground dealing with the whole child who is a healthy person, but who may have phases of sickness. It also spends some of its space defining health, and one definition is "A state of being hale, sound, or whole in body, mind, and soul." It covers most of these aspects adequately and yet extremely briefly and simply. It also deals with the care of the premature and newly born, with feeding and management problems and the diagnosis and management of the sick child in some of the childhood illnesses.

Of some of the above aspects, I am not qualified to judge, and Miss Preston is, so she will supplement my knowledge. With the general treatment of child care and management I am in agreement, and my only criticisms are that :—

(1) Gessell is too definite in his allocation of ages to milestones. I would say it is not possible to state definitely that a child does this or that at any specific age, let alone at any specific number of weeks. Also children differ in their rate of development from one country to another, and even from one social strata to another. All that one can say is that most children do it at this age and if they are much later, they may be a defective . . . or a genius ! . . . and many other factors have to be taken into account before you can assess which.

(2) I consider this book excellent for the aspiring G.P. and indeed for all medical students who ever expect to be confronted by a child, also for the Nursing and Health Visitors, members of the Medical Profession. However, unless the modern vintage of Social Workers have changed alarmingly since I joined their ranks in 1945, I would think this book is too technically a medical one to be of much help or comprehension to them.

This is one of those books which one hopes very soon to see in a cheaper paper-backed edition and so within the reach of all.

M. L. E. Desbottes.

It was a great pleasure to review such an excellent little volume. As with all textbooks on child care, the writer has his own ideas on the average child, whose acquaintance I have yet to make. If, however, the tables, etc., are regarded as rough guides and not as a deadline, they are of value.

Altogether the book has much in its favour, the layout is clear and easy to follow and the information is concise and of practical adaptability.

It is also most refreshing to read a book on Paedriatrics which devotes so much of its early chapters to the healthy child, the prevention of disease and normal growth and development. The chapters devoted to the diseases of children do not go into great detail, but the main facts are clearly shown in both diagnosis and treatment.

This could be a handy pocket-size book for all those who deal with children whether in the nursing or medical field.

S. Preston.

ELEMENTARY BACTERIOLOGY AND IMMUNITY FOR NURSES (3rd Edition) *by* Stanley Marshall. Published H. K. Lewis Co. Ltd. Price 9/-.

This 3rd edition, of just over 100 pages of well set out, clear type and coloured plates, should continue to prove most helpful in introducing Nurses to Bacteriology.

Apart from the occasional use of long words, in order to be scrupulously correct, the book is very easy to read and contains many practical observations of use to the Nurse in the Ward. The pages concerned with sterilisation and different types of immunity should be of particular value and interest to the Nurse in training.

J.M.J.

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LETTERS TO THE EDITOR

Sir,—I should be grateful for the courtesy of your columns in connection with the formation of a Rahere Dining Club in the East Midlands and South Yorkshire region. For three years a dining club limited to 25 Bart's men has met in Derbyshire annually. The members have been drawn from Sheffield and Nottingham, and it is now felt that the club should be enlarged, drawing members from a wider area and meeting in the larger cities in rotation. In fact, following the practice so successfully established in the West County by the Wessex Rahere Club.

I should be grateful if any Bart's men interested in joining such a club, and resident in South Yorkshire and the East Midlands, would get in touch with me.

I am,
Yours faithfully,
DOUGLAS ROBERTSON.

287, Glossop Road,
Sheffield, 10.

Sir,—In the March edition of the "Journal," W. V. Cruden's monograph "Cough" proved to be interesting and amusing. I also thought it erudite, except for one curious error.

If "tissicky" is corrected to "phthisiky," the origin of the word becomes self-evident

I am, Sir,
Yours truly,
H. WINCH.

Romford.

Sir,—I am grateful to Dr. Winch for pointing out that the word "Tissicky" comes from the Greek "Phthisis" rather than from the Latin "Tussis."

In my experience the word is always pronounced (using phonetic spelling "Tissicky" and never "Thighsicky." This is evidently an old custom, as Shakespeare uses the word "Tisick" for a consumptive cough.

I am, etc.,
W. V. CRUDEN.

Hove.

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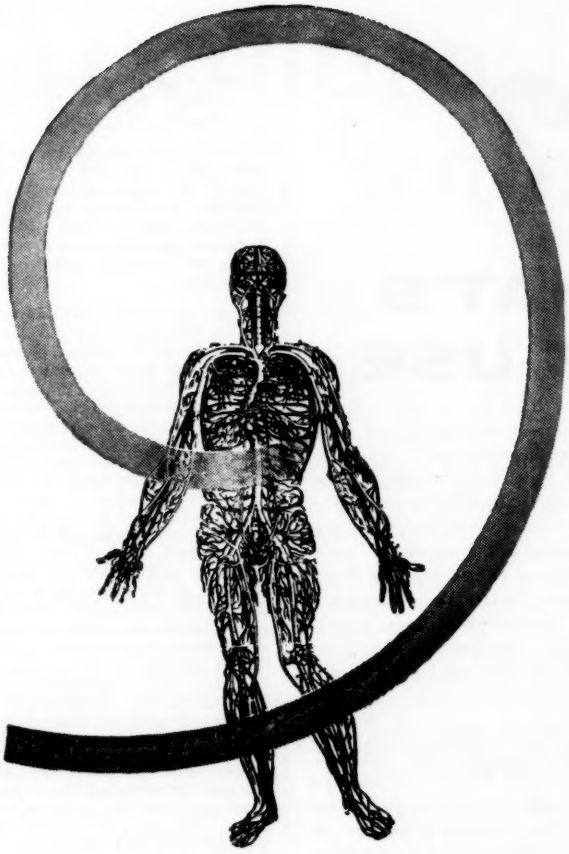

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WHAT'S THE USE

A famous mathematician once proposed a toast: "To the higher mathematics, and may they never be of any damned use to anybody." Another mathematician said more recently that the subject had no practical value—that it could not be used directly to accentuate the inequalities of human wealth, nor to promote the destruction of human life. We do not know whether the early biochemists held such a pleasantly detached view of their researches, or whether, if anyone said, "What's the use?", they would hopefully reply, like Faraday, "What use is a newborn baby?"

Whether their words were modest or not, useful value has, in fact, come from their work. Spectacularly so in the matter of the functions of vitamins. Take vitamin B_1—in other words, thiamine. It has now been established that thiamine is essential for the oxidation of pyruvate. When thiamine is lacking, pyruvate accumulates. This can cause very unpleasant, even serious symptoms. Various neuropathies (for example, tobacco-alcohol amblyopia with its alarming blindness) are associated with thiamine deficiency. Even today in diet-concious Britain, minor degrees of thiamine deficiency are by no means uncommon. Those who eat much carbohydrate need extra thiamine, as well as riboflavine and pyridoxine—indeed all the B-complex vitamins; and so do children when they are growing fast, and lactating and pregnant women, and girls slimming on slender diets. That is where Bemax is so useful. Being pure stabilized wheat germ, it contains all the B-complex vitamins, and is rich in iron and protein. You just sprinkle it on your food; Bemax goes well with cereals, curries, and a host of other dishes.

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BASIC CARDIOLOGY *by* T. E. Gumpert (1958) Wright, Bristoe. 157 pages and Ind'ex, 72 illustrations: 25/-.

This book is intended to bridge the gap between monographs on cardiology and accounts of the subject in textbooks embracing the whole of medicine. The author describes himself as a general physician with an interest in cardiology. After reading it, the unkind but relevant comment is that works on specialist subjects are best written by specialists.

There are many good points, such as a description of the physiology of heart failure, an account of the heart in pregnancy and in anaemia, and chapters on chest pain and on systolic murmurs. These are however overshadowed by inaccuracies and misconceptions elsewhere. That obesity and gout are causes of heart disease is surely debatable. Films in angiocardiography are not, as the author thinks, taken at two-second intervals. Quinidine is correctly recommended for ventricular tachycardia, but discontinuance is advised should the QRS duration exceed 0.12 second; but, in true ventricular tachycardia, the QRS frequently does exceed 0.12 second. The dosage of penicillin given for bacterial endocarditis is minimal and the combination of this drug with streptomycin for resistant cases is not mentioned. The chapter on congenital abnormalities is particularly open to criticism. Pulmonary hypertension is not even mentioned; nor is surgical relief of the stenosis in Fallot's tetralogy. Other misconceptions in this chapter are the association of ventricular septal defect with heart-block and of right ventricular hypertrophy in uncomplicated patency of the ductus arteriosus.

The book is clearly written and the common diseases are well described. The work is plentifully illustrated, but the x-ray reproductions are rather small. Fig. 50 (left ventricular enlargement) and Fig. 61 (Fallot's tetralogy) bear a remarkable resemblance to one another, and are hardly typical. This book cannot conscientiously be recommended to undergraduate or postgraduate students.

D. WEITZMAN.

AN INTRODUCTION TO MEDICAL LABORATORY TECHNOLOGY. SECOND EDITION F. J. Baker, R. E. Silverton, Eveline D. Luckcock. Butterworths, 408 pp. 35s. Butterworths, 408 pp. 35s.

The foreword of this book informs the intending reader that it has been written to prepare candidates for the Intermediate Examination of the Institute of Medical Laboratory Technology. The book contains sections on all four branches of pathology and includes also chapters on blood transfusion technique and elementary physiology. In order to cover this wide range the subject matter must remain at a fairly elementary level.

The book is admirably suited for its intended purpose and would also prove of value to any medical student particularly interested in practical pathological techniques.

R. G. H.